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(54) **Proximity Fuse**

(57) A proximity fuse for armour piercing anti-tank missiles has a proximity sensor providing signals for guiding the missile and igniting the fuse. Apart from an optical proximity sensor there is provided a capacitive or magnetic sensor which can be selectively adjusted according to distance or flight time and at the same time determines height above ground.

This print takes account of replacement documents later filed to enable the application to comply with the formal requirements of the Patents Rules 1978

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Fig.1

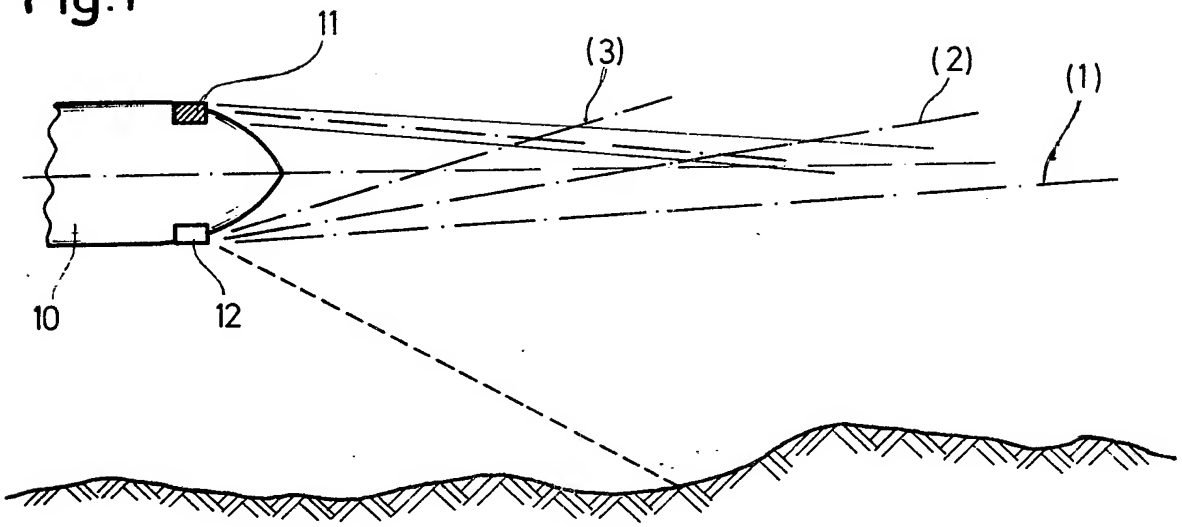


Fig.2

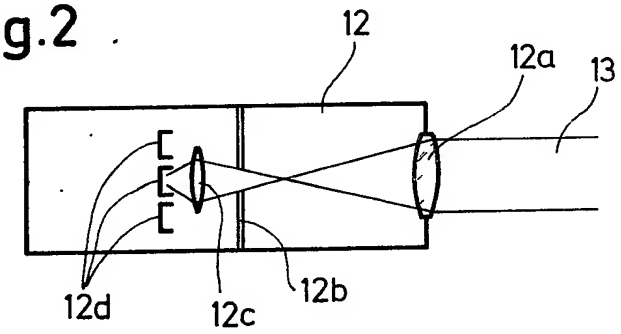
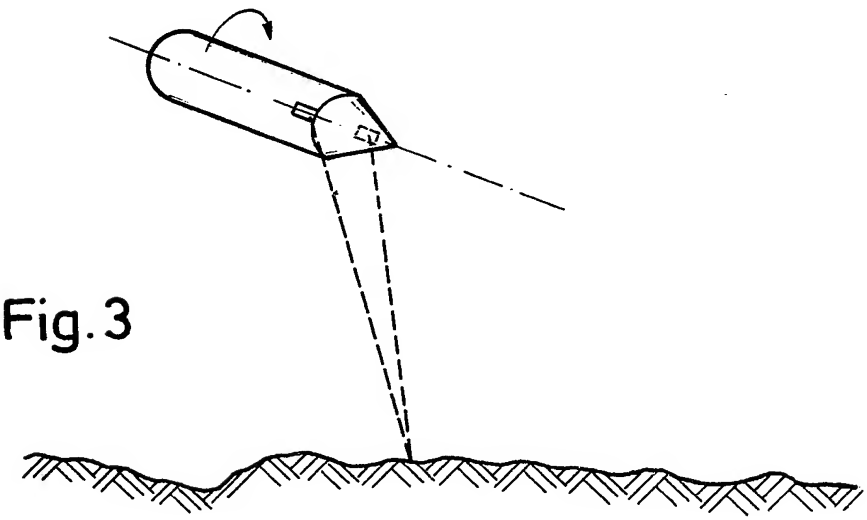


Fig.3



SPECIFICATION
Proximity Fuse

This invention relates to a proximity fuse primarily for armour piercing anti-tank missiles, the fuse having a proximity sensor the signals from which are used for guiding the missile as well as for triggering ignition.

In DE 26 08 067 a fuse circuit is described for scatter ammunition, particularly hollow charge ammunition, in which after dispersal of same a trigger circuit is controlled by a sensor which is actuated by the vehicle to be attacked, whereby a metal detector responding to a metallic target produces an ignition signal and a further sensor, on attaining a certain minimum distance from the target, actuates a switch provided between the metal detector and the trigger circuit in order to enable passage of the ignition signal. To achieve this an electro optical distance sensor is provided as an additional sensor. This suggested ignition circuit is intended to provide ignition when the target is positioned in the path of the scatter ammunition or also when the target approaches the ammunition. The measures suggested make it possible to use scatter ammunition not only as projectiles, but also as laid mines.

The conditions for operating target seeking missiles are, however, quite different. Apart from the fact that such missiles are relatively costly they are subject to interference as they are nearly not restricted at all in movability. Thus, for example, the metal detector responds to all metal objects, such as the steel pylons of high tension overhead cables. When a missile of the aforementioned type is on flight aiming at a specific target, it is possible for the on-board magnetic sensor to cause deviation from the flight path because of the presence of metal objects and thus causes the missile to be ignited by an undesirable target. On the other hand, ignition of the explosive charge only following impact is often ineffective.

It is an object of this invention to provide a proximity fuse wherein ignition occurs some 10 cm before impact and which additionally identifies tanks as targets.

According to this invention there is provided a proximity fuse primarily for armour piercing missiles having a proximity sensor providing signals which are used for guiding the missile as well as for triggering the fuse, the fuse being characterised by provision of, apart from an optical proximity sensor, a capacitive or magnetic sensor which can be selectively adjusted according to distance and flight time and which also determines the missile height above ground.

An embodiment according to the invention is shown by way of example and diagrammatically in the accompanying drawings. In the drawings:—

Figure 1 shows a missile nose including the sensors with their transmit and receive axes shown diagrammatically,

Figure 2 shows a cross-section through the receive sensor diagrammatically, and

Figure 3 shows in perspective the missile with the associated sensors and indicating the direction of rotation.

Referring to the drawings, the fuse of anti-tank missile 10 schematically shown in Figure 1 ignites a detonator to form a hollow charge jet some 10 cm to 1 m before impact with the target. The fuse has an optical proximity sensor 11 connected with a capacitive or magnetic sensor 12 for identifying the target tank. The latter sensor can be adjusted according to distance or flight time and is provided with a measuring device which apart from measuring the target distance also determines the height above ground. These measures enable ignition and the formation of the hollow charge jet to take place some 10 cm before the target. It is advantageous if the sensor 12 is an active optical sensor having an optical axis which is coincident with the axis of the hollow charge jet. Using the propagation time and phase comparision of the reflected measuring beam 13 or by triangulation (1,2,3) the sensor determines the distance of the moving target (in this case it is a tank) and supplies the missile and fuse with the appropriate corrected values to provide the correct sequence of operation. The electronic apparatus necessary for this purpose is generally known and is not described.

As the missile is intended to fly at relatively low heights, for example 1m above the ground, the sensor 12 is provided with an additional detected element 12*d* which for this purpose determines the height above ground and likewise feeds correction signals to the flight control apparatus to prevent ground contact.

The magnetic sensor may for example be a magnetic coil around the missile body, the induced voltage being provided by magnetic materials, the assumption being that the steel of the tank is magnetized by the earth's magnetic field. This provides a simple but reliable means of identification.

Claims

1. A proximity fuse primarily for armour piercing missiles having a proximity sensor providing signals which are used for guiding the missile as well as for triggering the fuse, the fuse being characterised by provision, apart from the optical proximity sensor, of a capacitive or magnetic sensor which can be selectively adjusted according to distance and flight time and which also determine the missile height above ground.

2. A fuse according to Claim 1, wherein an active optical sensor is used having the optical axis coincident with the axis of a jet formed from a hollow charge in the missile.

3. A fuse according to Claim 1 or 2, wherein the sensor determines distance from the target from the propagation time and phase comparison of a reflected beam.

4. A fuse according to Claim 1 or 2, wherein

the sensor determines the distance from the target by triangulation.

5. A fuse according to any one of Claims 1 to 4, wherein the magnetic sensor is formed by a coil located around the missile body.

6. A fuse according to any one of Claims 1 to 5, wherein a measured value representing height above ground provides guidance signals which prevent ground contact of the missile.

7. A fuse according to any one of Claims 1 to 6, wherein the triggering distance for the fuse is adjustable in accordance with the armour to be pierced at the target.

8. A proximity fuse, or missile incorporating such fuse, constructed and arranged to function substantially as herein described.

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